Fields of Opportunities

STATE OF IOWA

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To: Iowa UST Professionals
From: Tom Collins
Subject: Stage 1 Vapor Recovery Systems (VRS)

I just returned from a business trip to Dallas. I know what you're thinking, but it really was work related. EPA and the Association of State and Territorial Solid Waste Management Officials (ASTSWMO) generously sponsored and paid for the trip. The conference was about UST prevention and compliance and had a mostly state regulator audience.

I wanted to let you know about some of the material that was covered. Two items in particular: Stage 1 VRS—a presentation by Brad Hoffman, Tanknology, and Precision Testing at large GDFs, i.e., truck stops—a presentation by Greg Young of Vaporless Manufacturing. Greg's presentation is not yet available, but when it is, I will provide a synopsis and a link.

Brad Hoffman is director of training, testing and safety programs for Tanknology. His presentation covered Tanknology's Stage 1 Vapor Recovery Testing results from 2010. Here is the link to his presentation: Stage 1 VRS

To open the link on the attachment use Control + Click. Or right click on the link and then click on "Open Hyperlink." The actual address for the presentation is http://www.astswmo.org/files/meetings/2011USTCPWorkshop/presentations/HOFFMAN-Stage_I_Vapor_Recovery_Testing-March2011.pdf

**Required Testing**

As you know NESHAP 40CFR63 Subpart 6C requirements affect all UST sites in one way or another. Specifically, Gasoline Dispensing Facilities (GDFs) that have a monthly throughput of 100,000 gallons of gasoline or more must install Stage 1 VRS.

My colleagues at Air Quality, who administer NESHAP requirements, explain that the purpose of the 6C NESHAP is to reduce the emissions of hazardous air pollutants (HAPs) to the environment and to protect public health. EPA estimates that full implementation of 6C will result in national emissions reductions of 50,000 tons annually of volatile organic compounds, which will also eliminate over 4.5 million pounds annually of HAP emissions, such as benzene.

Testing of new VRS is required upon installation and every three years thereafter. Testing of VRS includes a 1) Pressure Decay Test (Static Pressure Test) and a 2)

Pressure/Vacuum (P/V) Vent Valve Test. For VRS installed before December 15, 2009, testing must be completed by July 10, 2011.

**Testing the Ullage Space of the Tank**

Most tanks do not have the ullage or dry portion of the tank tested if they use ATG systems or SIR. ATG systems and SIR only test the wetted portion of the tank, which allows for the potential release of vapors or fuel into the environment. Remember how DNR pushed hard for enhanced leak detection (ELD) testing a few years ago? We were concerned about the potential for vapors released from the tank contributing to higher benzene levels in groundwater. Stage 1 VRS changes all that.

The Pressure Decay Test for Stage 1 VRS verifies the tightness of the entire vapor recovery system, including tank top fittings, vent and vapor piping, and tank ullage space. With Stage 1 VRS, we not only prevent harmful vapors from being released into the atmosphere, we are keeping them out of groundwater as well.

Table 1 below indicates the seriousness of the problem with vapor releases. Out of 3412 sites tested, 2465 passed for a 72% passing rate. That's a pretty dismal success rate, and alarming when you consider most of the sites in Iowa are not required to install VRS and those that do have VRS likely have to undergo troubleshooting in order for them to pass.

**Table 1: Tanknology's Pressure Decay Test Results**

| **Number of Tests** | 3412 |
|---|---|
| **Number Passed** | 2465 |
| **Percent Passed** | 72% |
| **Number Failures** | 947 |
| **Percent Failures** | 28% |

Follow the link to the PowerPoint presentation and you will see the most common causes of failures. As you can imagine, leaks are detected wherever there is a fitting, joint, gasket, seal, O-ring or riser. Copper vent tubes for line leak detection on STPs and ATG risers are common sources of leaks that require minor repairs. A vapor detector and soapy water are used to troubleshoot failures. Sources of leaks that require major repairs include vent piping, spill containers, risers, cracks in fiberglass tanks, and tank manway gaskets.

**Pressure Vacuum Vent Valve Testing**

When pressure or vacuum from gasoline vapors builds up in the tank, the PV vent caps (either manifolded with one cap or independent caps) are designed to open at predetermined settings. Four tests are required for each PV vent cap:

1. Positive Leak Rate Test at 2.0" w.c. (measures how much air (vapor) can leak past the valve before it cracks open.
2. Positive Cracking Pressure at 120ml/min (measures the amount of pressure it takes to cause the valve to open. After the valve cracks it won't hold quite as much pressure.
3. Negative Leak Rate Test at -4.0" w.c. (measures how much air can leak past the valve before it cracks open.

4. Negative Cracking Pressure at 200 ml/min (measures the amount of vacuum it takes to cause the valve to open up when vacuum is building up. After the valve cracks it won't hold quite as much vacuum.

Caps must also meet total leak rate requirements for the entire site as well:

1. Positive Leak Rate Test at 2.0" w.c. (must be ≤ 80.2 ml/min (0.17 CFH)
2. Negative Leak Rate Test at -4.0" w.c. (must be ≤ 297.3 ml/min (0.63 CFH)

Review the PowerPoint presentation for testing procedures for PV vent caps. Vent pipes must be threaded to accept Enhanced Vapor Recovery (EVR) type PV vent valves. Vent valves may need to be cleaned with soapy water before testing in order to pass. Since they are precision devices, they may need annual maintenance to remain functional. Most old non-EVR caps won't be able to pass the test. Sites with four or more vents may have trouble passing for total leak rate. The solution would be to manifold the vents or have PV vent valves with very low leak rates.

**Table 2: PV Vent Cap Testing Results**

| **Total Number of Existing Vent Caps** | 9552 |
|---|---|
| **Number Passed** | 3755 |
| **Percent Passed** | 39% |
| **Number Failed** | 5797 |
| **Percent Failed** | 61% |

The results for PV Vent cap testing is much worse (61% failure) than the pressure decay testing on the tanks. In most cases, the wrong model or older version PV vent caps were the cause of failures. New valves had to be installed in order to pass the tests.

**So What Have We Learned?**

These test results are valuable for installers, regulators and testers. Testers and installers should be able to review Brad's presentation and figure out what can go wrong with testing and prevent it. For those sites that do not require Stage 1 VRS, installers and testers know where vapor leaks occur and can prevent them. Regulators realize that just because equipment is in place, it doesn't mean it is going to perform as required, and there is a lot involved in testing and passing. Owners and operators keep their investment in the tank instead of vaporizing into the atmosphere.

Unquestionably, Stage 1 VRS is one of the most significant improvements to air and groundwater quality in recent times. Do check out Brad's presentation.